Overview

➢ Noncancer Health Assessment

➢ Reference Concentration (RfC)

➢ Data gaps in developing an RfC

➢ Possible animal study objectives

Noncancer Health
Assessment Project Team

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Medical / Clinical	Dr. Aubrey Miller, Region 8
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Document Review
and Revision

➢ Internal review (in process)

➢ Review by other Federal Agencies

➢ External review: SAB (Fall 2007)

➢ Final revision based on SAB advice and
   web posting

Noncancer Health Assessment

Standard Chapters to Support IRIS

- ➤ Toxicokinetic data
- ➤ Animal toxicity data
- ➤ Health effects in humans
  - Nonpulmonary
    - ❖ Cardiovascular
    - ❖ Immunological (autoimmune)
    - ❖ Repro/developmental
  - Pulmonary
    - ❖ Changes in clinical parameters
    - ❖ Pleural pathology
    - ❖ Lung pathology
- ➤ Hazard characterization

Noncancer Health Assessment

Special Sections added for Asbestos

- ➤ Definition of asbestos mineral fibers is more inclusive

- ➤ Discussion of the geology and mineralogy of asbestos

- ➤ Overview of exposure, sampling and counting methods are described

- ➤ Clinical signs/symptoms

- ➤ Radiological diagnostic procedures and their merits are described and discussed

Reference Concentration

➤ For RfC development several options were considered
  - Human data
  - Animal data

➤ Epidemiologic data,Libby amphibole
  - Marysville, OH Plant workers
  - Being reviewed for RfC derivation

➤ EPA policy is to use human data where available and of appropriate quality

# Animal Studies to strengthen basis for noncancer risk assessment and risk characterization

➤ Biological plausibility in support of critical study and endpoint
  - Proof of the principle
  (e.g. Libby amphibole displays the same toxicity as other mineral fibers)
  - Confirm progression of disease after exposure has ended

➤ Susceptible populations

➤ Explore plausibility of non-respiratory effects
  - Autoimmune
  - Cardiovascular
  - Other

Animal studies:
Other Risk Assessment Needs

➤ Relative fiber toxicity
- Can the LA RfC be applied to all tremolite? Other amphiboles?
- Impact of fiber form on relative toxicity
- Impact fiber dimension on relative toxicity

➤ Explore dosimetrics
- Fiber concentration (current)
  - Surrogate measure of a subset of material
- Lung burden – residence time
- Surface area
- Relative fiber potency

Reference Concentration
Libby Amphibole

➤ Exposure units
- PCM

➤ Surrogate measurement possible in TEM units

➤ Minimizes impact of
- Fiber form
- Fiber dimensions
- Mineralogy

Length Distributions

Amosite

Libby Amphibole

Percent

Length (um)
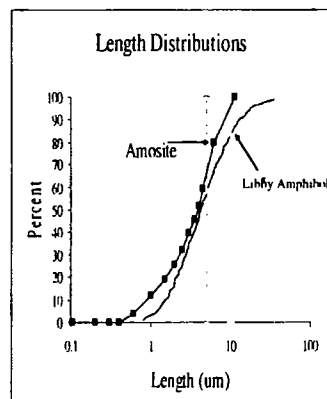
General Approach

➤ Tiered approach to studies
- Relative dissolution *in vitro*
- *in vitro* mechanisms (ROS, RNS etc.)
- Short-term *in vivo*
- Intermediate and chronic *in vivo*

➤ Use other forms of asbestos as controls
- Tremolite (UICC)
- Amosite
- Chrysotile (?)

➤ Measured dose
- *Fiber count*
- Dimensional characteristics
- Mass
- Surface area

➤ Tissue dose (initial and over time)

➤ Harmonize with cancer studies

Caution regarding quantitative extrapolation from animal studies to human exposures

Libby Asbestos Superfund Site
Conceptual Site Model
Operable Unit 4

Superfund/ORD Asbestos Research Needs Meeting
Research Triangle Park
January 17-18, 2007

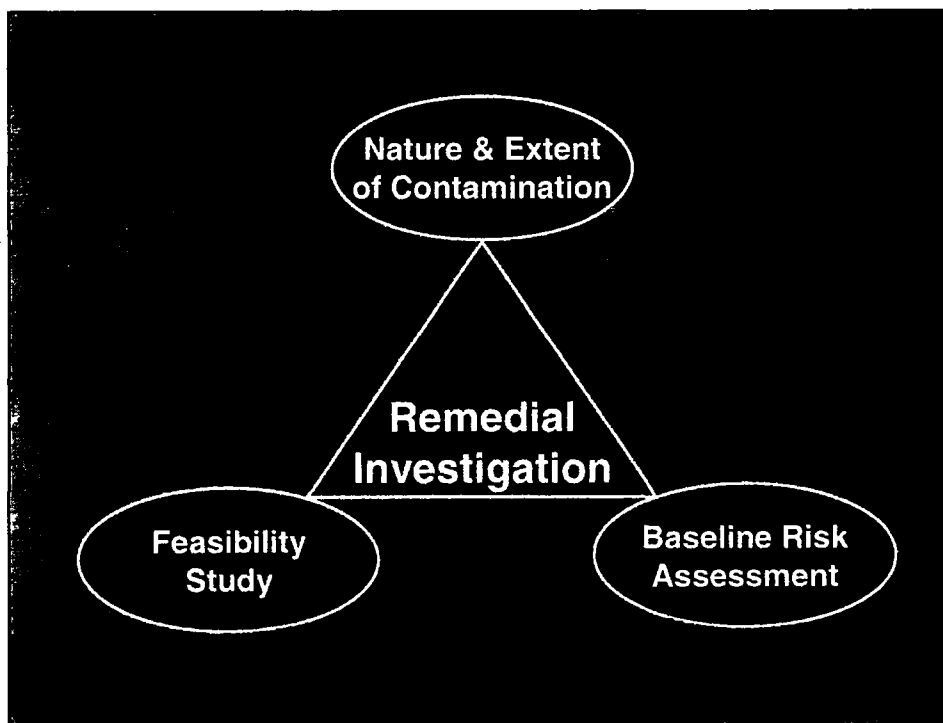Libby Team
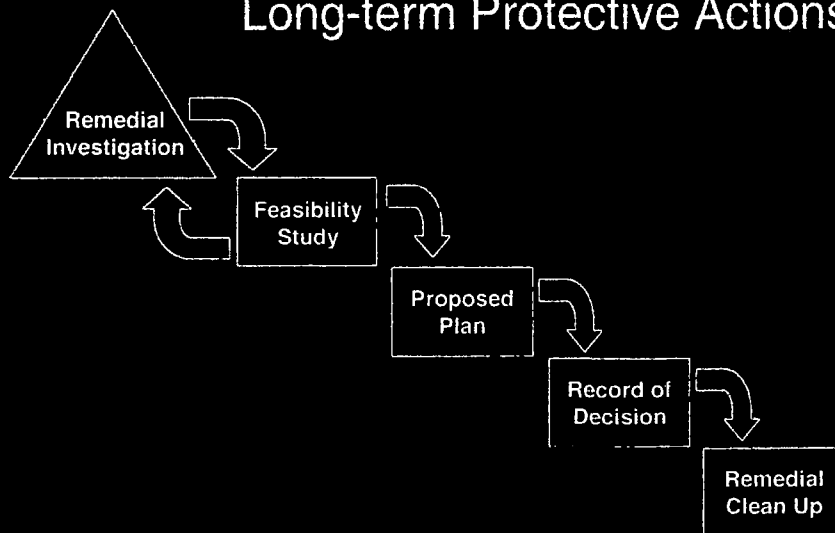USEPA Region 8

Roadmap

Conceptual Site Model context

Purpose of Conceptual Site Model

Libby Operable Unit 4 examples

The Superfund Remedial Process
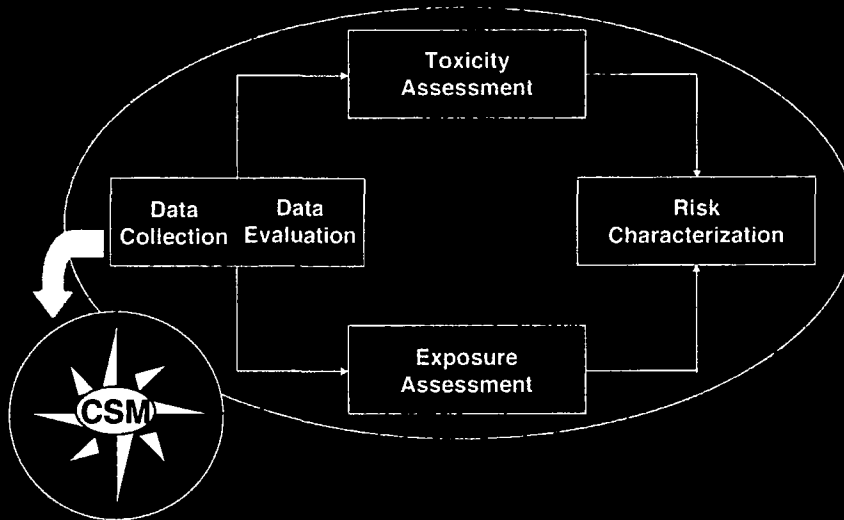## Long-term Protective Actions

Remedial Investigation → Feasibility Study → Proposed Plan → Record of Decision → Remedial Clean Up

Nature & Extent of Contamination

Remedial Investigation

Feasibility Study

Baseline Risk Assessment

Baseline Risk Assessment
Conceptual Site Model (CSM)

Toxicity Assessment

Data Collection Data Evaluation

Risk Characterization

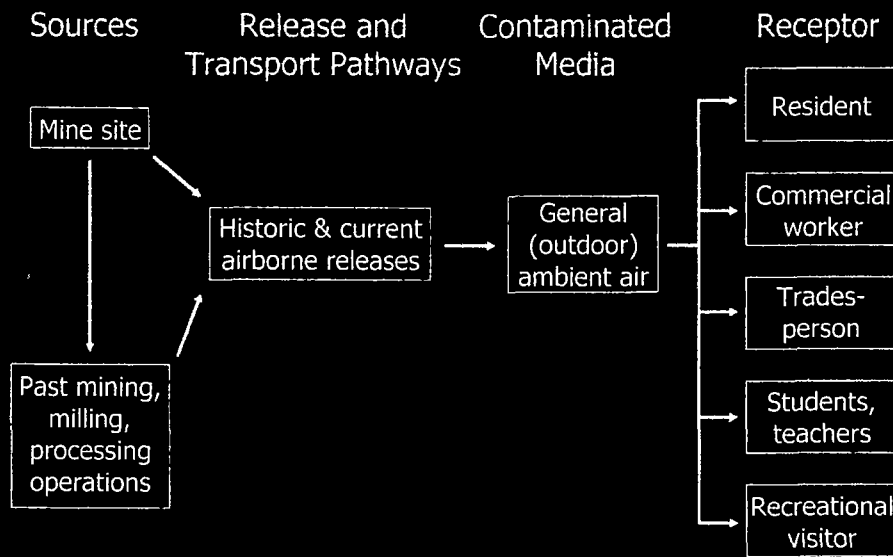Exposure Assessment

CSM

Conceptual Site Model

CSM

Identifies origin of contamination

Illustrates movement through the environment

Identifies receptors & routes of exposure

Describes potential exposure pathways

Example – Libby OU4

Sources	Release and Transport Pathways	Contaminated Media	Receptor

Mine site

Historic & current airborne releases → **General (outdoor) ambient air**

Past mining, milling, processing operations

Receptors:
- Resident
- Commercial worker
- Trades-person
- Students, teachers
- Recreational visitor

Summary

The Conceptual Site Model

- Describes potential exposure pathways

- Helps guide the development of the Baseline Risk Assessment

- Is a living document that helps direct future data collection activities

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